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Time for Shakespeare: Hourglasses, sundials, clocks, and early modern theatre

Shakespeare Lecture
read 21 May 2014

TIFFANY STERN

Abstract: Like a number of other prologues of the early modern period, the prologue to *Romeo and Juliet* is clear about the length of time its play will take in performance. Two hours. But how literal is that claim? A tendency to take the prologue at face value has resulted in the assumption that Shakespeare's plays, most of which take longer than two hours to perform, have not survived in their stage form. Instead, goes the argument, we have them in a totally different version: as they were rewritten, at length, for the page.

This article will question whether plays ever habitually took two hours to perform. It will look at the lengths of playtexts and will ask when and why the 'two hour' claim was made. But it will also investigate a bigger question. What did 'two hours' mean in the early modern period? Exploring, in succession, hourglasses, sundials and mechanical clocks, it will consider which chronological gauges were visible or audible in the early modern playhouse, and what hours, minutes and seconds might have meant to an early modern playwright who lacked trustworthy access to any of them. What, it will ask, was time, literally and figuratively, for Shakespeare—and how did chronographia, the rhetorical art of describing time, shape his writing?

Keywords: Shakespeare, time, hour, minute, hourglass, sundial, clock, chronographia

The claim that Shakespeare's *Romeo and Juliet* will last two hours survives in two forms. The prologue to *An Excellent Conceited Tragedie of Romeo and Juliet* (1597), a play of 2,215 lines in length, refers to 'the two howres traffique of our Stage'.¹ The prologue to *The Most Excellent and Lamentable Tragedie, of Romeo and Juliet. Newly Corrected, Augmented, and Amended* (1599), a play of 2,980 lines in length (longer by almost a quarter than the earlier text), also refers to 'the two houres trafficque of our

¹ William Shakespeare, *An Excellent Conceited Tragedie of Romeo and Juliet* (1597), A1r.

Stage². True, the 1597 *Romeo and Juliet* is corrupt in some way, and is not a direct record of the play as acted. Nevertheless, the fact that the ‘two hour’ assertion fronts one play in two highly different lengths should make us wary of taking the phrase literally; and indeed, throughout the early modern period, plays vastly divergent in word-count are said to last for two hours. Michael J. Hirrel usefully lists the line-lengths of thirteen of them, ranging from *The Hogge hath Lost his Pearle*, where ‘our Author . . . grieves you spent two houres so wast-full’ (1,951 lines), to Ben Jonson’s *Alchemist* where ‘Fortune, that favours fooles, these two short houres | We wish away’ (3,066 lines).³ ‘Two hours’, as these illustrate, is a convention rather than a factual statement, equivalent to the modern claim that films—movies—last for about two hours.

Though the average length of plays increased over the Caroline period, the assertion that they took two hours continued to be made. James Shirley’s *Dukes Mistris* (perf. 1636) begs the audience to ‘have patience but two howers’, but ‘have patience’ encodes the reality: at over 3,000 lines, the play in the form in which it survives will have taken considerably longer to enact.⁴ The ‘two hour’ declaration, as this example suggests, is particularly likely to introduce a text that will last longer. Thomas Goffe’s university drama *Orestes* (1633) which promises, in its prologue, ‘*The hush’d contentment of two silent howres*’, confesses in its epilogue that ‘Three howres space’ has been taken in order to ‘represent, | Vices contriv’d and murders punishment’.⁵ Before a play starts, particularly if it is to be a long play, it is prudent to tell spectators, or officials amongst the spectators, that the production will be snappy; after a play has ended, it is safe to tell them the reverse—that they have enjoyed a lengthy production. Of course, either claim only works if the spectators cannot themselves easily judge the passage of time.

It is not the case, however, that ‘two hours’ is the only amount of time plays were said to last. The Scrivener in the induction to *Bartholomew Fair* says his play will take ‘two houres and an halfe, and somewhat more’ in a combination of vagueness and precision that pokes fun at his trade (almost certainly the Scrivener flourishes a watch or other portable time-device while making this statement).⁶ And at least some dramas acknowledge performances of three hours’ duration. They include Thomas Dekker’s

² William Shakespeare, *The Most Excellent and Lamentable Tragedie, of Romeo and Juliet. Newly Corrected, Augmented, and Amended* (1599), A2r.

³ Hirrel (2010), 159–82; Tabor (1614), H4v; Jonson (1612), A4v.

⁴ Shirley (1638), A2r. Shirley assumed three hours was normal for a Blackfriars play; see his ‘To the Reader’ to Beaumont & Fletcher (1647), a3r: ‘this . . . Authentick witt . . . made Blackfriers an Academy’ when ‘the three howers spectacle’ was presented.

⁵ Goffe (1633), A1v, I3v.

⁶ Jonson (1631), A5r. That Ben Jonson himself owned a watch is a suggestion made by Gurr (1999), 68.

If It Be Not Good, the Diuel Is in It, which hopes to provide ‘three howres of mirth’; John Fletcher’s *The Loyal Subject* (perf. 1618), which will take ‘Three houres of pretious time’; and Fletcher’s *The Lovers’ Progress*, which, apologises Philip Massinger its reviser, ‘Could not’ in fact be contracted into ‘three short howers’—the defensive ‘short’, again, an attempt to mollify the spectators.⁷ Other accounts suggest that plays, or at least performances, might take longer still. German audiences were said to relish the productions of travelling English companies so much that they would gladly ‘Four hours . . . stand and hear | The play, than one in church appear’.⁸ As William Prynne, who hated plays, maintained performances ‘last some three or foure houres at the least’, while Henry Peacham, who loved them, declared they lasted—or, at least that coaches waited for their fares outside playhouses—for ‘five or six houres together’, all ascriptions of theatrical time-spans should be recognised as serving their own purposes, and unreliable as genuine measures.⁹

The accounts supplied above, all but one giving whole hours for play lengths, raise as many questions about early modern concepts of ‘Time, and the Houre’ (*Macbeth*, TLN 262) (the ‘and’ drawing a pointed distinction between actual and measured time) as they do about performances.¹⁰ What did ‘an hour’ mean to audiences or playwrights in Shakespeare’s time, and how might it, and hence two or more hours, have been gauged in an early modern playhouse?

* * *

The most usual instruments for measuring time in domestic and indoor spaces, and hence instruments most likely to have been found in indoor playhouses, and in the covered section of ‘outdoor’ playhouses, were sandglasses. These consisted of two conical glass bulbs bound together where their necks were narrowest, and filled with ‘sand’ (sand, iron filings, powdered eggshell or marble dust).¹¹ The sand would flow from the upper to the lower receptacle in a given period of time, most often an hour. Hence the term ‘hourglass’. As minutes were not shown by hourglasses, and quarter and half hours were hard to gauge from looking at the instruments, the ‘hour’ of ‘hourglass’ also described the sole unit of time that the device could comfortably reveal.

Hourglasses were used by a number of trades for which measuring a stated passage of time was important. Teachers in schools, for instance, tended to run lessons to the

⁷Dekker (1612a), M4r; Fletcher (1647a), 3G4v; Fletcher (1647b), 3M4v.

⁸Quoted and translated in Cohn (1865), xc.

⁹Prynne (1633), 306; Peacham (1636), B3r. For lengths of provincial and royal performances, typically over two hours, see Urkowitz (2012), 255–6.

¹⁰Unless otherwise stated, Shakespeare quotations are from the Folio facsimile prepared by Hinman (1968), using the through-line-numbers (TLN) of that edition. Speech-prefixes have been expanded throughout.

¹¹Glennie & Thrift (2009), 285.

hourglass, as shown by schoolroom pictures fronting Martin Luther's *An die Radherrn aller stedte deutsches lands* (1524) and Ulrich Zwingli's *Leerbiechlein wie man Knaben Christlich unterweysen und erziehan soll* (1523).¹² They favoured the hourglass because it could be turned, and lessons started, when all the pupils arrived, rather than when a clock struck; the school hour did not have to be dictated by an external timepiece. A further advantage of the hourglass was that it could be stopped and started at will, so that school breaks, or other intrusions on the working day, did not need to be publically recorded. For the same reason, workers notionally employed by the hour, like artist and etcher Wenceslas Hollar, were often really employed by the hourglass: when Hollar was interrupted, he 'always laid ye hour glass on one side' in order not to charge for time spent away from his work.¹³ His death in poverty did not reward this honesty.

Given that 'an hour' by an hourglass was seldom a literal hour, the people who relied on hourglasses most were those who needed to dictate time rather than be informed of it. Aubrey relates that Ralph Kettell, President of Trinity College, Oxford, told slacking students 'that if they would not doe their exercise better he would bring an Hower-glasse two howers long': he would elongate the students' working 'hours' until they learned to function more quickly.¹⁴ Likewise preachers, who gave sermons by the hour (a pulpit-and-hourglass is illustrated on the titlepage of *Holi or Bishop's Bible* of 1569, the church's authorised bible) would have 'long' hourglasses if they were keen speakers, and 'short' ones if they were not. Hence surviving church hourglasses contain variant amounts of sand, and published sermons of the period, all supposedly an hour long, are markedly divergent in length.¹⁵ 'An hour' by an hourglass, that is to say, was the length its owner desired it to be, and may not ever have had much in common with a literal hour: had a theatre employed an hourglass to measure its plays, that glass could not, anyway, have been trusted to last a 'real' hour.

Even when hourglasses were supposedly accurate, their construction always left them subject to error. Their two lobes, separately made by glassblowers, would not be entirely equal; their central seals, made of leather or string, would weaken and leak; their sand, statically charged by tumbling, or dampened by moisture, would clump. Changes in weather often affected hourglasses. Kingsmill Long observed that 'The . . . engines, that shew us the houres, doe by the drynesse or moistnesse of the Ayre, alter their course,' though he may have been writing about hourglasses or clocks of the

¹² Discussed and reproduced in Dohrn-van Rossum (1996), 256.

¹³ Francis Place, *Letter to George Vertue* (20 May 1716).

¹⁴ Aubrey (1949), 184. It is a two-hour hourglass to which Shakespeare refers when, in *All's Well*, he compares two circuits of the sun, and two of the evening star to 'foure and twenty' turns of 'the Pylots glasse' (TLN 775).

¹⁵ Chadwick ([1964], 1972), 420.

period.¹⁶ As all hourglasses also changed irrevocably over the years—the bore-width through which the sand dropped would be slowly widened by friction—the older the hourglass, the shorter the hour. That means that an hour as measured even by an allegedly consistent hourglass would vary according to the age of the glass, the time of the year, and the dampness of the room.

Moreover, any act of intervention—waving or turning an hourglass—would always affect the flow of the sand and hence alter the speed of ‘time’. A critical picture from 1663 shows interregnum preacher Hugh Peters (1598–1660) tilting the hourglass by which he is giving his sermon. Peters, said in the accompanying text to have been ‘the Jester (or rather a Fool) in Shakespears Company of Players’, is shown self-consciously extending his preaching hour.¹⁷ From his mouth unfurls a banderol in which he additionally requests that the congregation ‘Stay and take the other glass’, a parody of the invitation to stay for another drink: in fact Peters wants to turn the hourglass and preach for an additional hour (it was said that Peters once turned the glass twice in order to deliver a three hour sermon).¹⁸ Peters here is depicted as the kind of man who manipulates and falsifies ‘time’—perhaps, suggests the book, because he is at root ‘theatrical’.

Because handling an hourglass affected its accuracy, a period of time measured by an hourglass—the two hours of a performance, for instance—was always suspect. Unless someone turned the glass the very instant it emptied, there would be a delay and ‘time’ would be lengthened. If the glass were turned too early, ‘time’ would be foreshortened, a fact well known to ship’s boys: encouraged by sailors to ‘swallow the sand’ they would invert the ships’ hourglasses before they had run their course so as to curtail the working day.¹⁹ But even if an hourglass were upended the second it drained, the very act of turning, and the pressure of setting it down again, would, as with tilting the glass, also affect ‘time’. This is illustrated by a 1703 story about a French fleet that, hampered by fog, sailed for nine days relying only on hourglasses to measure the day. When the fog finally lifted, the fleet was found to be eleven hours out.²⁰ Hourglasses, useful for marking single hours—up to a point—were terrible at defining anything more. Measuring two hours by the glass would have been even more subject to error than measuring one hour.

¹⁶ Kingsmill Long, translator of John Barclay, *Barclay His Argenis* (1625), 119.

¹⁷ Yonge (1663), 7–8. That he really was a clown for the King’s Men is open to question, but Malone (1790), 1:ii:219, thought he could have played in London while rusticated from Cambridge between 1613 and 1617.

¹⁸ Yonge (1663), title page. Peters (1660), 27: ‘M^r Peters having on a Fast day preached two long heures, and espying his glasse to be out after the second turning up; takes it in his hand, and having againe turned it, saith, *Come my Beloved, we will have the other glasse, and so wee’le part*’.

¹⁹ Guye & Michel (1970), 266.

²⁰ *Ibid.*, 262.

So theatrical companies are unlikely to have used hourglasses to determine ‘real’ time, and less likely still to have used them to measure duration. They did, however, frequently employ hourglasses symbolically and as props.

Shakespeare, for instance, uses an hourglass as the main source of time in one of his major plays. *The Tempest* is set not simply within twenty-four hours, as the so-called ‘unities’ of time, place and action, demanded; it (putatively) takes place in real time. Towards the beginning of the play, in 1.2, Prospero confirms that it is ‘At least two Glasses’ past midday (i.e. at least 2 o’clock by the hourglass; TLN 359–61). He goes on to declare that ‘The time ’twixt six & now | Must by us both be spent most preciously’ (TLN 361–2), affirming that the action of the story will take place in real time, between two (the time plays conventionally started) and six—suggesting, incidentally, that this play was expected to last for four hours. When towards the end of the play, he is told that it is indeed now ‘On the sixth hower’ (*Tempest*, TLN 1949–50), the relationship of play time to real time is apparently reaffirmed.

Reference to an hourglass in the play, however, confuses the idea that play time and real time are the same. Shortly after Ariel states that the sixth hour has arrived, the Boatswain provides a different, hourglass, reading of the time. He rejoices that ‘our Ship, | Which but three glasses since, we gave out split, | Is tyte, and yare, and bravely rig’d’ (TLN 2209–11). i.e. that it is 3 hours after 2 p.m., so 5 p.m. This may of course reflect the fabled unreliability of hourglasses, but the result is that within the short duration of *The Tempest*, a ‘double time-scheme’ is inserted. In fact, *The Tempest* could even be said to have a triple time-scheme. Ferdinand tells Miranda that ‘’tis fresh morning with me | When you are by at night’ (TLN 1275–6), though, in the three/four hour duration of the story, he has never seen her at morning or at night.

Making *The Tempest* apparently conform to the unities—but then not—is just one of the ways in which the play reflects upon the nature of time. *The Tempest* stars a magician who can make shattered ships instantly whole, wet instantly dry and swords freeze in mid-air: Prospero is, by his very nature, beyond real time.²¹ The play itself could be said to be beyond time too: its title, *The Tempest*, has its roots in the Latin ‘tempestas’, ‘storm’ but also ‘tempus’, ‘time’—it is a storm/time drama which plays fast and loose with both. Having a fickle hourglass in *The Tempest* merely emphasises the fact that a rigid observance of ‘time’ is being questioned rather than exploited in the play.

Hourglasses were, as *The Tempest* exemplifies, often employed for their emblematic rather than literal qualities. In an hourglass, the sand, and hence ‘time’ could be seen running out and stopping: Gower, the narrator in *Pericles*, describes the

²¹ Driver (1964), 367. For more on the crucial nature of time to *The Tempest*, see Sokol (2003).

approaching completion of the play by observing that ‘our sands are almost run’.²² He implies that the whole play, which covered many years, lasts, in a larger sense, an hourglass’s hour. If he has an actual hourglass to accompany his talk, that instrument will itself have added to the drama’s metatheatre, illustrating that ‘real’ and ‘fictional’ time are about to converge as the story and the play reach their shared end.

Because hourglasses showed time coming to a halt, they were naturally thought of as emblems of death. Tombstones were decorated with hourglasses; bodies were buried with them; and the published chits that invited people to funerals and warned them to ‘remember to die’ (a literal translation of ‘*memento mori*’, ‘remember that you will die’) were covered with hourglass pictures.²³ Shakespeare likewise exploited hourglass-death symbolism. In *1 Henry VI*, for instance

ere the Glasse that now begins to runne,
Finish the processe of his sandy houre,
These eyes that see thee now well coloured,
Shall see thee withered, bloody, pale, and dead. (TLN 1985–9)

The projected death will coincide with the filled lower bulb of the hourglass; in this play, chillingly, the hourglass has a literal and a symbolic meaning at the same time.

Hardly surprisingly, an hourglass, wings and sometimes a scythe were said to be the instruments of the personified abstract of time, ‘Father Time’—a conflation of Kronos–Saturn, the Greek–Roman deity of time, and Death, the Grim Reaper. In Middleton’s *The Triumphs of Truth*, Time enters ‘attir’d agree-able to his Condition, with his Hower-glasse, Wings, and Sithe’; in Dekker’s *Troia-Nova Triumphans*, Time has ‘wings, Glasse, and Sythe’.²⁴ Shakespeare, too, staged Father Time with accoutrements. Midway through *The Winter’s Tale*, a character enters and takes upon himself ‘(in the name of Time) | To use my wings’ (TLN 1580–3). In sixteen crisp couplets, he moves the tale forward by sixteen years; halfway through, at the end of the eighth couplet, ‘I turne my glasse, and give my Scene such growing | As you had slept betweene’ (TLN 1584–96). This hourglass does not, then, have anything to do with a literal hour: insofar as it represents time at all, it stands for sixteen years. But its purpose seems to be to divide the play into two halves as much as to convey time. The sand that diminished in the first half of the play is now ‘growing’ in the glass’s reversed direction, the word conjoining ‘expanding’, ‘developing’ and ‘advancing’: the ‘tragic’

²² William Shakespeare, *Pericles* (1609), 12r.

²³ For more on these, see Clymer (2012), 265–306.

²⁴ Middleton (1613), C1v; Dekker (1612), B2v. For more on the staged personification of time, see Kiefer (2003), 159.

the parentheses allow of a different explanation. The doubled brackets on each side of the gap present a visual depiction of an hourglass.²⁷ The hourglass | Time that the youth first held, and then became, finally possesses the poem itself; the inevitable triumph of time becomes the conclusion not just to this sonnet but to the entire series of ‘youth’ sonnets.

But if the hourglass had symbolic properties, then so did time as imagined through an hourglass. When, in *Cymbeline*, Pisanio says ‘Since she is living let the time run on, | To good, or bad’ (TLN 3403–4), he makes a typical hourglass analogy, for in an hourglass time always ‘runs’, the word conflating ‘flow’, which is what sand does, and ‘hurry’. In an hourglass, time is always rushing to its inevitable end. For Shakespeare, hourglasses, staged or imagined, were symbolically meaningful; it would have been difficult, as well as undesirable, to stage them in a merely practical way. There is every reason to think that hourglasses were only ever used on stage for special, and often emblematic, reasons.

There were, though, alternative ways of telling the time in public spaces. The most dependable access to time in early modern England required the observer to be outside, however—for it was provided by sundials.

Sundials were ‘accurate’ because they did not tell the time but find it. When the sun shone, its light hit the sundial’s gnomon (pointer), casting a shadow onto a plate marked with the hours and, sometimes, the half hours (minutes were not to become features of English sundials until 1671²⁸). The shadow, revealing the sun’s position in the sky, would show solar time, a measure so accurate that it remained the definition of time until 1967.²⁹

Sundials, however, had to be situated in unshaded spaces in order to be useful; finding a good location for one in any early modern theatre would have been very difficult. A ‘vertical dial’ needed to be placed high up, ideally on a south-facing wall—but etching one on the ‘inside’ of a round theatre would have been useless, as that wall would have been regularly cast in shadow by the other walls. A ‘horizontal dial’ needed to be placed in an unobstructed, open area—but putting one in the least shadowed part of the playhouse, the centre, would have been impossible: that is where the stage met the audience. In an indoor theatre there was, of course, no place for a sundial—but there seems to have been no obvious location for one in an outdoor theatre either.

As sundials only worked when the sun was out, moreover, they would have been hopeless as the sole source of time in the theatre. Though at the height of summer they might potentially tell the time between roughly 4 a.m. and 9 p.m. (in the depth of winter they could only tell the time between roughly 8 a.m. and 4 p.m.), geographical

²⁷ A point made by Graziani (1984), 79–82.

²⁸ Brown (2007), 239.

²⁹ Turner (2002), 22.

placement tended to give them a much more limited range. And, of course, in any season, sundials were useless when the sky was overcast. The

Dyall can bewray,
To the sad *Pilgrim*, th'hower of the *Day*:
But if the *Sun* appeare not his Adviser,
His eye may looke, yet he prove ne're the wiser.³⁰

Dials also did not work in the evenings or at night, of course—their very name of ‘dial’, deriving from the Latin ‘*dies*’ (‘day’) draws attention to the fact that they are reliant on daylight—but their haphazardness at other times made them the worst devices for measuring duration. A sundial could only, for instance, have recorded the length of a play if both the beginning *and* end of the play were sunny. There is no reason to think that sundials were a theatrical source of time.

Sundials were, however, like hourglasses, rich symbolically. They were paradoxical, disclosing the sun’s passage through the medium of shade, as the mottos with which they were decorated reminded the reader—‘*lux umbra dei*’ (‘light is the shadow of God’), ‘as a shadow such is life’, are typical sundial sententiae.³¹ Revealing and hiding the time at random, sundials also had an unpredictability and arbitrariness that made them resemble the God whose time they reflected. As Robert Hegge wrote in 1630:

a Dial is the Visible map of Time, till whose Invention ’twas follie in the Sun to play with a shadow. It is the anatomie of the Day; and a scale of miles for the journie of the sun. It is the silent voice of Time, and without it the Day were dumbe . . . It is the book of ye Sunn on which he writes the Storie of the day . . . Lastly heaven itself is but a general Dial, and a Dial it, in a lesser volume.³²

Naturally sundials were, like hourglasses, important emblematically for the drama.

In 3 *Henry VI*, Shakespeare stages a king who imagines what life might be like if he were one of his subjects. In the rustic, pastoral idyll he projects for himself, he would, as a ‘homely Swaine’, spend his day recording the progress of the sun by capturing its passage on the ground, creating, as a result, his own personal sundial.

Oh God! me thinkes it were a happy life,
To be no better then a homely Swaine,
To sit upon a hill, as I do now,
To carve out Dials quaintly, point by point,
Thereby to see the Minutes how they runne:
How many makes the Houre full compleate,

³⁰ Quarles (1632), 8.

³¹ For a list of sundial mottos, see Gatty (1872).

³² Robert Hegge, *Heliotropum Sciothericum*, quoted in Gatty (1872), 116.

How many Houres brings about the Day,
 How many Dayes will finish up the Yeare,
 How many Yeares, a Mortall man may live. (TLN 1155–63)

The king thinks that if he could only capture time he would control it. But the fact that he imagines recording what a sundial cannot show—minutes are too small and days and years too large—reveals how little he understands sundial time, and by extension, actual time. His suggestion, moreover, that the humblest of his subjects might devote his days to making sundials, a process known as ‘dialing’, reveals that he has misunderstood his people too.³³ ‘Dialing’ was an exclusive hobby; only people with expertise and spare time could indulge in it. As *Horologigraphia. The Art of Dialling* (1593) makes clear, potential dialers

must acquaint themselves with . . . Mathematicall principles, as to knowe what the Elevation of the Pole meaneth, how a squire line is to be drawne, and such like . . . *Difficilia quae pulchra* [‘fair things are difficult to attain’], and yet small paines overcommeth all.³⁴

The ‘homely swains’ the king desires to mimic would never have been dialers, and would probably have taken their time from nature itself: ‘merrie Larkes’, as the song has it in *Love’s Labour’s Lost*, ‘are Ploughmens clockes’ (TLN 2870). The fact that Henry VI imagines and perhaps mimes making his impossible sundial while almost certainly under the canopy of a shaded stage will only have drawn attention to the ironies of his speech. One cannot see shadow in shadow—and the King’s own time is overcast.

Yet though playhouses are unlikely to have had public sundials, spectators who owned Nuremberg ivory ‘diptych’ (‘folded in two’) dials, the most expensive portable sundials, are bound to have brought them to the theatre. Nuremberg dials consisted of two delicate ivory tables, thin enough to be permeable to the light, which were hinged at one end; the lower half contained markings and a compass (so that users could align themselves with the north); the upper half contained tiny pictures, mottos, and additional information. When opened, the cord that linked both halves stretched and became the gnomon.³⁵ Things of beauty as well as practical use, Nuremberg dials were status symbols. But they were not the only portable dials likely to have made their way to the theatre. Less expensive dials, carried in pockets, must also sometimes have found their way there. These were ‘ring dials’, also known as ‘pendent dials’, ‘horological rings’ and, because of where they were kept, ‘pocket dials’; they consisted of metallic rings of about an inch in diameter, marked on the outside with, generally, a motto and

³³ Cohen (2006), 129.

³⁴ Fale (1593), A3v.

³⁵ Lloyd (1992).

the seasonal cycle, and, on the inside, with the hours. '*Hung by the hand*,' they were '*turned towards the Sun; that by its Beams darting through smal Pin-holes made for that purpose, the hour of the Day may be found*'.³⁶ Other dials, which could be instantly made from whatever was to hand, could come into being at any time and in any place, including a theatre—for a stick, correctly angled between thumb and forefinger (if the holder faced the right direction), would cast a shadow onto the fingers which could be 'read' by the initiated.³⁷

But though portable sundials must have made their way into the playhouse on occasion, the building will have rendered them all but useless. Each of the personal dials described above required direct sunlight; shadows from other members of the audience, as well from the playhouse walls, will have made them unusable most of the time. All three also required the user to turn in order to be in correct geographical alignment with the sun—hard to do while watching a play. It is unlikely that portable dials were ever *used* in the theatre; if they were, they will, of course, have presented the same problems with measuring duration as large sundials.

Yet the social as well as symbolic ramifications of portable dials seem to have made them a source of metatheatrical comedy. In *As You Like It*, Jaques relates meeting Touchstone contemplating life while looking at a 'dial'. Though 'dial' here just might mean a watch—the word, borrowed from sundials, was sometimes applied to a clock face—what Touchstone is looking at is an instrument he can afford, use directly after having 'bask'd . . . in the Sun' (TLN 988), and keep in his 'poke' (pocket). It is almost certainly a ring ('pocket') dial. Touchstone, relates Jaques, took

a diall from his poake,
And looking on it, with lacke-lustre eye,
Sayes, very wisely, it is ten a clocke:
Thus we may see (quoth he) how the world waggess:
'Tis but an houre agoe, since it was nine,
And after one houre more, 'twill be eleven,
And so from houre to houre, we ripe, and ripe,
And then from houre to houre, we rot, and rot,
And thereby hangs a tale. When I did heare
The motley Foole, . . . I did laugh, sans intermission
An houre by his diall. (TLN 993–1006)

Jaques is poking fun at the pretensions of the fool who concludes 'very wisely' some truisms of the 'dial' variety: that people ripen and rot as fruit does (an extension of thinking about the progress of nature governed by the sun, and the sort of observation

³⁶Moxon (1659), 136.

³⁷As described by Koebel (1532).

that might be a dial's motto).³⁸ So Jaques is also, it seems, making fun of those audience-members who are beholden to their sundials. Yet the joke is so written as to redound against Jaques too. He lives amongst people who have opted to 'Lose and neglect the creeping houres of time' (TLN 1089) in the forest: if Touchstone moralises on time somewhat tritely, Jaques wastes it altogether.

When Shakespeare imagined the abstract 'time', he sometimes did so from a sundial perspective. While sand in an hourglass moved rapidly, the shadow of a sundial inched along so slowly that it was hardly perceptible: there was something furtive and underhand about time as a sundial presented it—'Thou by thy dyals shady stealth maist know, | Times theevish progresse to eternitie'.³⁹ When in *Rape of Lucrece* 'they that watch, see time, how slow it creeps',⁴⁰ or when, in *All's Well*, 'On our quick'st decrees | Th' inaudible, and noiselesse foot of time | Steales' (*All's Well*, TLN 2746–8), no sundial is mentioned, but the references to quietness and stealth suggest Shakespeare is thinking in sundial terms. Again, a device is determining how 'time' is conceived.

Now for the third option for telling the time, the clock. As clocks were attached to churches, palaces and the Royal Exchange, might they have been placed, too, on playhouses? Could a public clock have been the source of the theatre's time?

At first glance, a clock might appear attractive for a theatre. A playhouse clock would have dictated when '2 p.m.', the hour at which plays were to start, actually occurred. Yet possession of a clock would also have been troublesome. Church clocks were supposed to provide parish time; if theatres offered rival times they would have invited (further) religious objection. Even declaring when '2 p.m.' actually occurred will not necessarily have been useful for theatres: it will have prevented their being flexible over when plays should actually start. Theatres had, in fact, no clear reason to desire public clocks.

Moreover, clocks' ability to measure units of time smaller than an hour would have done the theatre no good service. Though minutes were not marked on clocks—the minute hand, invented by Jost Bürgi for Tycho Brahe in 1577, was not to come into regular use until the 18th century—the space between the twelve hours on a clockface was typically subdivided into quarters. So as the single hour hand rotated round the clock face, it led up to and away from the quarter hours (though the word 'hour' in 'quarter of an hour' and 'half an hour' illustrates that the hour remained the quintessential unit of time). When the Gentlewoman in *Macbeth* describes Lady Macbeth as rubbing her hands for 'a quarter of an houre' (TLN 2123), for instance, she shows that quarter hours are, for her, a known unit of estimation, and perhaps

³⁸ Bedford, Davis & Kelly (2007) 25.

³⁹ Shakespeare, *Sonnets*, F1r.

⁴⁰ William Shakespeare (1594), L2v.

even that she has measured Lady Macbeth's actions using a clock—Lady Macbeth, this may suggest, is trapped within ever smaller units of time, or time itself is now narrowing in on Lady Macbeth. But the fact that almost all play-durations are given in whole hours, rather than in quarter or half hours, strongly suggests there were no visible clocks in the theatre: theatres would gain no advantage by broadcasting to the quarter hour the true length of plays.

Further drawbacks of clocks include the fact that, for all their meticulousness within the hour, they were less accurate than any other kind of time measure. When they had just been wound, they would unwind quickly; when they had not been wound for a while, they would unwind slowly: all clocks started too fast and ended too slow. Only in 1656, when Christiaan Huygens invented the pendulum regulator, was this aspect of clockwork to improve.⁴¹ Clocks were, additionally, susceptible to friction, and liable to rust in wet weather; if oiled, they would go too fast until the deposits left from the fats slowed them down again. Most clocks ultimately lost time. A shortfall of between fifteen minutes and an hour a day was normal, though Cornelis Drebbel, Dutch polymath, mechanical inventor, and master clockmaker, who boasted that he had invented clocks that eliminated errors of 'two or three hours' per day, shows how unremarkable a much greater loss was thought to be.⁴² In Shakespeare's day, it would barely have been worth a playhouse's while expending money on so ungovernable a device.

Because of the inaccuracy of all clocks, moreover, any place that had a clock also had to have a sundial; the clock could then be adjusted whenever the sun shone. That is why good 'ministers' of the period were said to resemble 'the Sun-diall, by which men set their Clocks': in a pleasing analogy, sundials allowed man's flawed work to be corrected by God.⁴³ On older churches, even now, clocks and sundials are still often found on the same church wall, facilitating the easy correction of one by the other, as well as giving the watcher two options from which to gauge the hour. Clocks were not, then, thought of as sources of time in themselves; they were sundial-proxies, useful for predicting the time when the sun was in. That means, though, that a place that could not have a sundial—like, it has been suggested, a playhouse—could not have had a clock anyway.

Add to this the fact that running a clock cost considerably more money than the already-high price of its mechanism. Clocks needed constant tending: ideally they would be corrected when the sun shone, and wound when they became slow (roughly every eight hours).⁴⁴ They required, that is to say, dedicated clock-keepers—such as

⁴¹ Sherman (1996), 2.

⁴² Turner (2002), 16; Drebbel is quoted in Sokol (2003), 132.

⁴³ Brinsley (1656), 21.

⁴⁴ Glennie & Thrift, 33.

George Farmer, whose duties as clock-custodian for the Royal Exchange in 1636 were ‘to keepe [the clock] soe that it shall not vary from ye Sunne above one quarter of an hower’.⁴⁵ To employ, house and pay someone to be clock-keeper in a theatre, however, would have been hard to justify as an additional expense.

It was different for churches, where most public clocks were housed. In churches, there was already a person living on site, the sexton, who could take on the role of clock-keeper. Hence the succession of jokes concerning sextons and errant clocks—like the one about the ‘foolish *Sexton*’ who ‘sets his Clock by others Clocks, without ever looking to the Sun’, or the one about ‘the old *Sexton*, who swore his Clock went true, what ever the Sunne said to the contrary’, or Calvin’s joke made when ‘through the Sextons knavery’ the clock struck in the middle of one of his Geneva sermons: ‘God makes the dayes; but Martin (the Clock-keeper) makes the howers, as he pleases.’⁴⁶ Shakespeare came up with his own version of the joke, describing ‘Old Time’ himself as ‘the clocke setter’ and ‘y^t bald sexton Time’ (*King John*, TLN 1257–8), suggesting that Father Time reflects the aged sexton whose clock (mis)represents him. Like other playwrights, Shakespeare naturally also exploits the fact that the sexton–clock-keeper was also the church’s digger of graves. When he makes the ‘First Clown’ in *Hamlet* a grave-digger and a sexton, for instance, he creates a walking *memento mori* whose very appearance will have combined time with death and thus literalised the fact that ‘The time’ itself ‘is out of joynt’ (TLN 885). Yet Shakespeare’s casual assumption that clock-keepers are clownish figures of fun also, of course, suggests that his theatre did not have one.

A further reason for playhouses not to have had clocks is to do with placement. As church ‘clock towers’ indicate, clocks needed to be situated high up, so that there would be a substantial area underneath them to contain the falling weights. Were a playhouse to have had a clock, it would also have needed a ‘spare’ turret. Most theatres simply will not have had the structure or space for such a device. There is no reason to think, then, that a clock was attached to the theatre, and therefore no reason to think that clock-time was *visible* in that building.

Yet, as with the other instruments of time, the poetic ramifications of the look of the clock were important for Shakespeare. The fact that it was circular, that its single hour hand rotated continuously, and that it would never stop if properly cared for, meant that it was analogous to ‘eternity’. And, with its final number, ‘12’ immediately yielding to its first number, ‘1’, in a repeated cycle, a clock suggested renewal, rebirth, resurrection. So when Shakespeare in his sonnets conflates the conclusion to the *Gloria Patri* (‘world without end’) with time—referring to ‘the world without end

⁴⁵ Saunders (1997), 92.

⁴⁶ Younge (1646), 99; Cleveland (1644), 2; Gataker (1653), 37.

heure'—he seems to be imagining a version of time that has the endless quality of a clock.⁴⁷ Once again, his abstract of time alters according to the instrument through which he is envisaging it.

So important was the look of a clock to Shakespeare that, in a passage in *Othello*, a revision apparently changes a quotation about the appearance of a sundial to a quotation about the appearance of a clock. That play exists in two versions, one published in 1622 and one published in 1623, in both of which Othello maintains that he has been singled out by the cruel finger(s) of the 'time of scorn'. In Quarto 1 (1622, but probably reflecting 1604 performance), he says that he has been made 'A fixed figure, for the time of scorne, | To point his slow **unmoving** finger at' (bold mine).⁴⁸ In the folio text (1623, but probably reflecting 1606 or later performance), he says that he has been made 'The fixed Figure for the time of Scorne, | To point his slow, **and moving** finger at' (TLN 2748–50) (bold mine).⁴⁹ In both, then, Othello is a number ('figure' puns on person and numeral) on a dial. But an *unmoving* finger is a gnomon on a sundial continually pointing at Othello; a *moving* finger is the hand on a clock that slowly approaches and then arrives at a number. On the sundial, Othello will be pointed at forever; on the clock, the moving finger will select, point, move away, and then select and point again in a never-ending cycle. The revision, if that's what it is (the change could result from a misreading or printing-house error), replaces the fixed scorn of the sundial with the eternal cycle of dread, anticipation and selection offered by the clock.

There was also a further visual feature of clocks to which Shakespeare was very much beholden, though it was unique to some particularly characterful clocks: the clock jack. Clock jacks were special automata, generally resembling men, who would apparently, and sometimes actually, strike the hours on the clock bell. As the sole activity of 'jacks' (the word may mean 'knave', or be derived from 'jacomarchiadus', 'a man in a suit of armour') consisted of hitting, they were in their natures furious, but this was belied by their small height and circumscribed motion. Often given personal surnames—surviving jacks include 'Jack Blandiver' (Wells Cathedral, Somerset), 'Jack the Smiter' (St Edmund's Church, Southwold, Suffolk), 'Jack Hammer' (St Michaels Church, Minehead, Somerset)—clock jacks were a visual manifestation of the individual nature of clocks and of the conscribed nature of time.⁵⁰

Though there will certainly not have been a clock jack in any of Shakespeare's

⁴⁷ Shakespeare, *Sonnets*, D4v.

⁴⁸ Quoted here from William Shakespeare, *Othello* (1630), I4v, which 'corrects' *Othello* (1622), K3v, in which the word reads 'fingers'.

⁴⁹ Dating the two versions of *Othello* to before and after 1606 reflects the fact that the 1622 version contains swearing and the 1623 version does not: in 1606 the 'Act to Restrain the Abuses of the Players' outlawed blasphemy in the theatre.

⁵⁰ Starmer (1917), 1–17.

theatres, they are present in his plays: Shakespeare was fascinated by the automata and their rage, powerlessness and personality. In a section of *Richard III* (Q1 only: it may have been added to or subtracted from the play), Richard loses patience with Buckingham:

Buckingham	My lord.
King	I, whats a clocke?
Buckingham	I am thus bold to put your grace in mind Of what you promisd me.
King	Wel, but whats a clocke?
Buckingham	Upon the stroke of ten.
King	Well, let it strike.
Buckingham	Whie let it strike?
King	Because that like a Jacke thou keepst the stroke Betwixt thy begging and my meditation, I am not in the giving vaine to day. ⁵¹

Commentators on this passage often suggest that Buckingham is the noisy clock jack who disturbs the meditations of the clock, Richard. This is to misunderstand the passage, which is about *not* striking, and the movement of clock jacks, which was frustratingly slow: Edward Sharpham refers to ‘common people’ whose ‘tongues are like the Jacke of a Clocke, still in labour’.⁵² In this passage, Richard blames Buckingham, hitherto his trusty jack of the clock, for ‘keeping’ (the verb here means ‘suspending’) the stroke. That is because literally, Richard wants Buckingham to ‘strike’ Prince Edward. Yet Richard III’s likening of Buckingham to a puppet is also a coded warning. Buckingham is supposed to be jack to Richard’s clock. If he will no longer strike, he will lose his purpose altogether.

Shakespeare’s most haunting reference to clock jacks comes in *Richard II* when the dying king compares himself to a clock:

I wasted Time, and now doth Time waste me:
For now hath Time made me his numbring clocke;
My Thoughts, are minutes; and with Sighes they jarre []
Their watches on unto mine eyes, the outward Watch,
Whereto my finger, like a Dialls point,
Is pointing still, in cleansing them from teares.
Now sir, the sound that tels what houre it is,
Are clamorous groanes, that strike upon my heart,
Which is the bell: so Sighes, and Teares, and Grones,
Shew Minutes, Houres, and Times: but my Time

⁵¹ William Shakespeare (1597), L2r.

⁵² Sharpham (1607), D2r.

Runs poasting on, in *Bullingbrookes* proud joy,
While I stand fooling heere, his jacke o' th' Clocke. (TLN 2715–26)

Often treated as one single comparison—Richard sees himself as being like a clock in a clock tower—the passage in fact contains a haunting change of referent. At first Richard imagines his body is a turret and his head is the clock: his thoughts are the ‘jars’ (ticks) which force the ‘watches’ (intervals of time) into his eyes; his face is the clock-face; his finger, wiping his tears, is the clock-hand; his heart is the clock bell which, when struck, realises his groans as its chime. ‘But’, he then realises, ‘my Time | Runs posting on’. It is only at this moment that he makes his real insight. He is not actually a clock at all. He is merely a mechanical jack doing someone else’s bidding; the clock, the source of time, is Bolingbroke.

Yet though Shakespeare’s spectators may not have been able to see a clock or a jack in the theatre, they will nevertheless have had a sense of clock time. That is because clocks were aural as well as visual. Clocks had bells that rang out the hour: in fact, they *were* bells at their root, the very word ‘clock’ descending from Dutch ‘klok’ and Old Northern French ‘cloke’ (whence comes the modern French ‘cloche’) meaning ‘bell’. Because of clock bells, ‘the Houres’ could be ‘heard a farre off, whither we lye in our bed in the night, or in the day time we be farre from a Diall’.⁵³ Playgoers will, then, have heard the passing of the hours chiming from London’s many clocks, even if they could not see them.

The problem, from a listener’s point of view, will have been from which clock to source the time. For each of London’s clocks (and half of London’s one hundred and ten parishes had clocks) would strike the hour at a different moment.⁵⁴ Hence Dekker can maintain that ‘the time of Powles,’ referring to the bells of the cathedral, ‘goes truer by five notes then S. Sepulchers Chimes’: Dekker claims that time from the cathedral, with its large, carrying bell, is more ‘true’ (‘correct’ in time and ‘accurate’ in note—he conflates the two) than time from the nearby Newgate church.⁵⁵ In so doing, he also suggests that bells, with their separate sounds and designations—and sometimes names—were thought of as local and individual, much as clock jacks were. His statement shows in miniature what was the case across the land: that all clocks had a different resonance and told a different time. As the proverb had it, ‘They agree like the clocks of London’, meaning ‘they disagree’; it was a given that ‘the Clocks of England, . . . never meete jumpe on a point together’.⁵⁶ As any hour approached, the

⁵³ Seventeenth-century manuscript compiled by a Richard Smith and quoted in Bedini, Doggett & Quinones (1986), 65.

⁵⁴ Paul Glennie, quoted in interview in MacGregor (2013), 221.

⁵⁵ Dekker (1609), 22. For more on the rivalry between one church’s bell and another, see Smith (1999), 53.

⁵⁶ Ray (1678), 325; Nashe? (1589), B4r.

city will have started to swell with sound. Which clock to listen for, and whether or not to trust it, will have been a decision that each individual playgoer had to make.

Audiences will, at least, not have worried about mistaking ‘time’ with the other occasions that set London ringing. Bells of event, which summoned people to church, announced marriages, warned of dangers, or mourned deaths, were swung to and fro, their clappers repeatedly hitting their sides, a process known variously as ‘ringing’, ‘pealing’ or ‘tolling’. The echoic term ‘ding dong’, probably an attempt to replicate the sound of the clapper when it strikes each side of a bell, refers to this kind of ringing, which Shakespeare associates particularly with the tolling for a funeral: ‘*Let vs all ring Fancies knell. | Ile begin it. | Ding, dong, bell*’ (*Merchant of Venice*, TLN 1415–17); ‘*Sea-Nymphs hourly ring his knell . . . Harke now I heare them, ding-dong bell*’ (*Tempest*, TLN 545–7). These event bells sounded entirely different from clock bells, which were kept stationary and then ‘struck’, ‘chimed’ or ‘beaten’ with a hammer, one ‘chime’ being sounded for each hour. Though verbs for the different forms of hitting a bell were not as distinct as they are for today’s campanologists, when Falstaff famously relates that ‘Wee have heard the Chymes at mid-night, Master Shallow’ (2 *Henry IV*, TLN 1749–50), he is likely to be using the formal term for the strokes of a clock bell (rather than describing the sound of a carillon).⁵⁷ Time was never, then confusable with event—but it was confusable with competing other times.

As the sound of bells could travel over significant distances—the bell of Conch Abbey in France could be heard from two leagues in any direction; the bell of Lincoln Cathedral, ‘Tom a Lincoln’, could be heard ‘three miles off’—spectators in the theatres could conceivably have continued to follow their own parish times during performance, irrespective of the parish in which their theatre was situated.⁵⁸ That meant they may have followed a different hour entirely from that of the rest of the audience. For Charles Dickens, three hundred years later, was able to describe a London in which

The city time-measurers are so far behind each other, that the last chime of eight has hardly fallen on the ear from the last church, when another sprightly clock is ready to commence the hour of nine. Each clock, however, governs, and is believed in by, its immediate neighbourhood.⁵⁹

This 1857/8 statement is somewhat nostalgic—the majority of public clocks had been standardised to GMT by 1855—but it shows how time remained separate, different

⁵⁷ Cf. the fact that on every other occasion on which Shakespeare mentions the sound of midnight, he writes of the sound of a single bell: ‘Let’s mocke the midnight Bell’ (*Antony and Cleopatra*, TLN 2369); ‘If the mid-night bell | Did with his yron tongue, and brazen mouth | Sound on into the drowzie race of night . . .’ (*King John*, TLN 1336–8); ‘the iron tongue of midnight hath told twelve’ (*A Midsummer Night’s Dream*, TLN 2145).

⁵⁸ Corbin (1998), 6; Fletcher (1640), E2r.

⁵⁹ Dickens (1857/8), 147.

and parish-based until railway timetables made shared national time a necessity.⁶⁰ But if people gathered in one place may still have taken their times from different clocks, it will have been impossible for them to have an agreed sense of the hour, and so impossible for them to come up with a shared idea about the length of a play.

As ever, Shakespeare exploited the sound of clocks dramatically. When clocks struck, the listeners would 'tell' (meaning 'count') the strokes; the origin of the phrase 'tell the time'. Shakespeare used this fact to fictional effect, having stage clocks sound at significant moments, and stage listeners 'tell' them. So in *Cymbeline* Imogen goes to sleep when it is 'Almost midnight' (TLN 907) and Iachimo then emerges from the trunk to explore her sleeping body and steal her bracelet. At the end of that scene, which takes under five minutes to perform, a '*Clocke strikes*' and Iachimo counts the hours: 'One, two, three', he reckons, 'time, time' (TLN 958–9). On a practical level, this enables Shakespeare to compress duration and show that what has happened so swiftly on stage has lasted three fictional hours. But the reference to that particular passage of time also, of course, provides symbolic information. Imogen had, we have been told, 'read three houres' (TLN 908) before closing her book at the point where Philomel was raped. Iachimo has now 'read' Imogen's body for a further three, violating it visually and performing actions that almost lead to Imogen's death as an adulterer: Iachimo's own form of rape. The troubling scene may, however, also be relieved by the fact that 'three' has positive fairytale qualities; the number may hint at better things to come.

One of Shakespeare's most resonant examples of clock-counting is in *Macbeth* when Lady Macbeth, sleepwalking, tells the strokes of a remembered clock. In her somnolent state, Lady Macbeth relives the night when Duncan was murdered: 'One: Two: Why then 'tis time to doo't' (TLN 2127–8). Yet in the scene she remembers, to which the audience was witness, no clock chimed 2 a.m. Instead, a bell rang twice, once putatively signalling that Macbeth's drink was ready (but really signalling that it was time for action), and once raising the alarm because Duncan was dead. Lady Macbeth has conflated the two jangling bells into two strikes of the clock, as though no sooner had the murder been heralded than it had been done, and the time for regret had already slipped away. That, or Shakespeare has conflated, wittingly or unwittingly, the property bell *as bell* and the property bell *as clock*.

For in the theatre itself, one prop probably doubled as bell and clock, being swung for the one and struck for the other. Shakespeare certainly has a habit of writing 'bell' when he means 'clock', suggesting the two were conflated in his mind. 'Marcellus and my selfe,' relates Barnado, 'The Bell then beating one . . . ' (*Hamlet*, TLN 49–50) as he tells of events took place at 1 a.m.; 'Let's mocke the midnight Bell' (*Antony and*

⁶⁰ Famously discussed in Thompson (1967), 56–97.

Cleopatra, TLN 2369) says Antony, anxious to drink past midnight. Whether or not the stage possessed more than one bell, however, its reliance on a property clock will have made it particularly unlikely to want a real one. A real clock would have drowned the actors' voices hourly, while conflicting with and perhaps upstaging the fictional time told/tolled by the property clock.

As with sundials, so with clocks, it remains possible that audience members brought portable clocks or 'watches'—the word appears to have come from 'wacchen', keep alert—to the playhouse. If so, they will, as with the possessors of Nuremburg dials, have been making statements about themselves as much as about time. When John Harington decorates his 1591 translation of *Orlando Furioso* with a picture of himself displaying his magnificent carved watch, he is showing that he has used his time well (he had been banished by Elizabeth until he completed his translation), but also that he has the visible accoutrements of a courtier: he is ready for readmittance to court. Watches, being carved and decorated with jewels, were status symbols: implying someone had a watch—asking the time 'o'clock' when no public clock was visible—was to make assumptions about that person's wealth and rank. So Malvolio, projecting his ideal future, imagines a world in which he will wear and publically 'winde up' a watch while waiting to castigate Sir Toby (TLN 1075), though that comparison may also show Shakespeare snubbing the watch-wearers amongst his audience.

As time-keepers, however, watches were worse than public clocks. If their owner felt for the time—the clockface, which was glassless, had raised knobs on the hour markers so it could be 'read' without looking—the hour hand was likely to be jerked from its position. But even the simple fact of walking while wearing a watch, which would be hung around the neck or attached to the clothing, could jolt the verge and foliot motion out of kilter. Hence Berowne in *Love's Labour's Lost* compares womankind to

a . . . Cloake,
Still a repairing: ever out of frame,
And never going a right, being a Watch. (TLN 956–8)

Watches, like women, are never 'right', he maintains; what he does not mention, but is a subtext here, is that watches, like women, are desirable, correct or not.

Because of their inaccuracy, watches were, like clocks, reliant on being rectified when the sun shone. In Thomas Dekker's *2 Honest Whore* Infæliche and Hipolito argue about the comparative virtue of their watches (and by implication their attitudes to chastity):

Infæliche	how workes the day, my Lord, (pray) by your watch?
Hipolito	Lest you cuffe me, Ile tell you presently: I am neere two.

Infæliche	How, two? I am scarce at one.
Hipolito	One of us then goes false.
Infæliche	Then sure 'tis you,
	Mine goes by heavens Diall, (the Sunne) and it goes true. ⁶¹

Some watches were even constructed so as to reveal, when opened, a sundial and compass on one side, and a clockface on the other, their mechanism including its source for correction.⁶² Watches, in other ways too, mirrored the clocks from which they derived. They often contained bells or '*Larums* . . . that are ever striking' on the hour.⁶³ That made them, of course, unsuitable for public gatherings: even if brought to theatres, watches are unlikely to have been used there.

For Shakespeare, though, the watch too had its own dramatic power. In *The Tempest*, Sebastian insultingly compares old Gonzalo, whom he sees as being slow, wrong and loud, to a chiming watch. Gonzalo is, says Sebastian, 'winding up the watch of his wit, By and by it will strike.' Gonzalo then tries to speak:

Gonzalo	Sir.
Sebastian	One: Tell.
Gonzalo	When every greefe is entertaind . . . (TLN 687–92)

Sebastian's 'One' shows him counting the first 'strike' of Gonzalo's 'watch'. But as he does not then go on counting, the passage has long confused editors. Only in 1997 did T.W. Craik come up with a solution: 'Tell', he suggested, is a not word that Sebastian utters, but a stage direction in the imperative mistakenly set as dialogue.⁶⁴ '*Tell*' ('Count') instructs Sebastian to drown out Gonzalo's ensuing speech with continued counting. That, or Sebastian may be issuing an instruction to his co-tormentor, Antonio, to do the 'telling' himself. Either way, this joke about the striking watch, yet a further reference to time in the *Tempest*, may also be a warning to the audience to turn off their chiming timepieces.

So how will spectators in fact have known about the passage of time in theatres? The most readily accessible time will have been relayed by the 'nearest' clocks—St Mary Overies (now Southwark Cathedral) for the round outdoor playhouses of Southwark, the clock of St Ann (destroyed in the fire of London and not replaced) for the Blackfriars. The other bells of these churches will have been useful too: they will have tolled for the 2 p.m. afternoon service some time in advance, so informing potential audiences when to set off for the theatre.⁶⁵ The clocks of St Mary Overies and St

⁶¹ Dekker (1630), E2r.

⁶² Guye & Michel, 68.

⁶³ Dekker (1606), 24.

⁶⁴ Craik (1997), 514.

⁶⁵ For the times of afternoon services, which were at 2 p.m. or later, see Graves (1999), 68.

Ann, stating their parish time, will probably also have been the clocks from which—or, presumably just after which—the playhouses took their 2 p.m. starting times. Like almost all the clocks in London, any of which might have been an audience's source for time, however they will have tolled only the hour. That fact explains why, in the plays of Shakespeare, references to time 'o'clock' (time from a clock—rather than time 'o'day' which was time by the sun) is so often to time in whole hours:

'It's one a clocke Boy, is't not' (*Henry VIII*, TLN 2771); 'two o'clocke is your howre' (*As You Like It*, TLN 2091–2); 'The Curphew Bell hath rung, 'tis three a clocke' (*Romeo and Juliet*, TLN 2546); 'Tis now but foure of clock' (*Merchant of Venice*, TLN 800); 'at five a clocke . . . Ile meete with you upon the Mart' (*Comedy of Errors*, TLN 189–90); 'my nose fell a bleeding . . . at six a clocke ith morning' (*Merchant of Venice*, TLN 861–2); 'tis now some seven a clocke' (*Taming of the Shrew*, TLN 2170); 'let him be sent for to morrow eight a clocke' (*Merry Wives*, TLN 1527–8); 'Tis nine a clocke' (*Merchant of Venice*, TLN 966); 'it is ten a clocke' (*As You Like It*, TLN 995); 'by eleven a clocke it will goe one way or other' (*Troilus and Cressida*, TLN 2149–50); 'this present twelve a clock at midnight' (*I Henry IV*, TLN 1059).

That whole hours were the *audible* unit of time explains, too, why characters in Shakespeare's dramas describe times within the hour by reference either to the hour last struck or the hour that is expected: 'Is it good-morrow, Lords?' asks the King in 2 *Henry IV*; the reply is 'Tis One a Clock, and past' (TLN 1455–6); 'Tis almost five a clocke cosin,' says Beatrice in *Much Ado* (TLN 1550); 'tis not yet ten o'th'clocke' relates Iago in *Othello* (TLN 1125–6).

There were only two clocks in London that rang quarter hours. St Paul's Cathedral contained clock jacks who were 'up with their Elbows foure times an houre' hitting their bells (hence their name of 'quarter jacks').⁶⁶ But these jacks, located in what Dekker calls 'the Dukes gallery', probably the north transept of St Paul's, were inside the cathedral; they confined their quarterly information to those already in the building.⁶⁷ At the Royal Exchange, London's largest shopping precinct, however, 'A verry strong & substantiall clock' was built in 1600, with 'two faire large Jacks' made to 'strike the quarter upon two good tunable bells'.⁶⁸ Those jacks will indeed have broadcast their quarters into the city after 1600. Yet given that the Royal Exchange's quarters were almost certainly, as in later such clocks, struck on lighter 'ting-tang' bells than the hour (and given, as before, the fact that lengths of plays are referred to in whole hours), there is no reason to think that the Royal Exchange's quarters were audible—or, if they were audible, were listened to—by any of Shakespeare's audiences.⁶⁹

⁶⁶ Middleton (1604), A3v.

⁶⁷ Dekker (1609), 19; Schofield (2011), 146–7.

⁶⁸ Saunders (1997), 92.

⁶⁹ Williams (1998), 68.

So what, then, do the ‘two hours’ with which this article began actually refer to? If they relate to anything, it seems to be to time by a striking public clock, heard but not seen. But ‘two hours’ by a striking clock are not the same as two hours by a visible clock. When looking at an early modern clock, the hour hand would have been seen rotating through the quarter and half hours. But when listening to an early modern clock, only the hour would have imposed itself. One set of chimes would have meant that an hour had passed; a second set of chimes that two hours had passed. If there was no third set of chimes, then three hours had not passed. In other words, ‘two hours’ by an audible clock probably means any period of time less than three hours—or indeed less than four hours if the play did not start as an hour struck; ‘three hours’, by extension, might mean anything less than five.⁷⁰ Not only, then, is the audience’s source of time in question; so too is the duration said to have been measured by it. ‘Two hours’ was not only a cliché, but a cliché for ‘something less than three (or four) hours’, which is the performance length of *Romeo and Juliet* anyway.

The lack of timepieces in the theatre was actually so well known that it became the subject of a theatrical ‘quip’ by Robert Armin, actor and author, and the lead ‘fool’ of Shakespeare’s company from 1600. Armin would sometimes, after a play had ended, invite the audience to shout ‘themes’ at him to which he provided an extemporised response. Some of his favourites seem to have been worked up for publication as *Quips upon Questions*, a book which includes his answers to the questions ‘Why barks that dogge?’ ‘Who’s dead?’ and ‘What ayles that Damsel?’⁷¹ One of Armin’s poems is an answer to ‘Whats a clocke?’ Armin replies, in a series of ways, that it is impossible for him to know because he is in the theatre. He is not ‘Jacke of clock-house’ (he is a *jack*, but only in its sense of *knave*) so he is not the source of time; he cannot supply an answer ‘by the shadow’ or ‘the day’, because, presumably, he has no sundial. When the questioner finally suggests Armin check the time on the church, the fool reaches the end of his tether. ‘Wilt thou know whats a clocke?’ he demands. ‘Then go and see.’⁷² If you want to know the time, says Armin, leave the theatre.

* * *

As has been shown the theatre eschewed real time. As has also been shown, ‘time’ was a fluid concept in the early modern period, and even hours, the only units revealed by

⁷⁰That two hours meant ‘under three hours’ is put forward by Williams (2006), 43: “‘Two hours’ traffic” meant something around two hours, more than a strictly measured two hours. More than two, probably but, certainly, less than three . . . Perhaps we may extrapolate to modern times . . . Marketers, psychologists, and we know perfectly well that though \$2.95 is very nearly three, it is not three; it is only two and some more’.

⁷¹Armin (1600), A4r; B1r, D3r. For more on the clown’s exchange of themes, see Stern (2009), 248.

⁷²Armin (1600), C3r.

most timepieces, were notionally and practically diverse depending on whether one was indoors or outdoors, whether the sun was shining or obscured, whether it was day or night, and whether one could hear—and was prepared to trust—the nearest public clock. Add to that the fact that the very word ‘hour’ was unfixed in durational meaning: the church appointed its ‘offices’ to be spoken at six, seven or eight (they varied in number according to historical period) ‘canonical hours’ including the ‘major hours’ ‘matins’, ‘lauds’, and ‘vespers’, and the ‘minor hours’, ‘prime’, ‘terce’, ‘sext’, ‘none’, and ‘compline’. All differed in length from a clock hour, and all might be variously measured: ‘prime’, for instance, could represent the first hour of daylight, roughly 6 a.m., or the gap of time between it and the next canonical hour, ‘terce’ (roughly 9 a.m.), a period of around three clock hours. No wonder, then, that the very concept of ‘hour’ was always somewhat fluid.

Minutes were less definable still. As discussed, they were not shown on normal hour-glasses, or sundials. Nor were they displayed on ordinary clocks. In *Rape of Lucrece*, hindrances to Tarquin are compared to ‘those bars which stop the hourelly diall, | Who with a lingring staie his course doth let, | Till everie minute payes the howre his debt’.⁷³ Here, the bar of the knobbed hour marker holds back the hand; when the hand finally jolts forward, it renders up its ‘debt’ of all the hitherto constrained minutes.⁷⁴ Thus this reference, sometimes said to be to a clock with bars for each minute, is actually to a ‘normal’ clock with hour bars: hence the hand is held back ‘hourly’.

References of the period suggest that most early modern people had never seen or heard—and hence had not *experienced*—a minute. Writes William Harrison in 1577, ‘Our common order . . . is to begin at the minute, as at the smallest part of time knowne unto the people, notwithstanding that in most places they descend no lower then the halfe quarter or quarter of the howre.’⁷⁵ The very word ‘minute’, in the early modern period, remained unclear, retaining its root sense of *minute*—very, very tiny—rather than being specific: ‘Minute’, according to Edward Phillips in his *New World of English Words* (1658), means ‘little, small . . . also a Minute is substantively used for a moment or the smallest part of time’.⁷⁶ When Shakespeare wrote ‘minute’, for instance, he seems to have conceived of something instant like a second. Thus though he places a piece about the way ‘our minuites hasten to their end’⁷⁷ as, tellingly, his sixtieth sonnet—he knows sixty minutes make an hour—he also writes ‘Now at the latest minute of the houre [i.e. ‘at the very last moment there is’] | Grant us your loves’

⁷³ William Shakespeare (1594), C4v.

⁷⁴ For an exploration of the sexualised horological metaphors in *Lucrece*, see Chapman (2013), 165–87.

⁷⁵ Harrison (1577), 117.

⁷⁶ Phillips (1658), 2C2v.

⁷⁷ Shakespeare, *Sonnets*, E1r.

(*Love's Labour's Lost*, TLN 2746–7); ‘Now minutely [i.e. ‘every minute’, ‘all the time’] Revolts upbraid his Faith-breach’ (*Macbeth*, TLN 2196). When Shakespeare reaches for the most ‘puny’ units of time, explains Kerrigan, ‘he speaks of “wretched minutes”’.⁷⁸ Blocks of five and ten minutes were likewise mysterious to Shakespeare, being unmarked on any instruments of time. Only once does Shakespeare write about a period of time made up of accumulated minutes. Puck in *A Midsummer Night's Dream* claims that he will ‘put a girdle about the earth in forty minutes’ (TLN 552–3). The joke here is that forty minutes is an unmeasurable amount of time. Only a fairy could use it.⁷⁹

Shakespeare never mentions seconds, an element of time known at the period only by theoreticians—natural philosophers, astronomers and astrologers. When Shakespeare conceives of a period of time that is smaller than a minute, he does so by referring to portions of a minute: in another reference to time in the world of magic, the fairies in *A Midsummer Nights Dream* are asked to go ‘for the third part of a minute hence’ (TLN 652).

For Shakespeare, then, ‘time’ in its minutiae was hard even to conceive—but all time will have been, for him, somewhat fictional. His urge to describe time was, therefore, in its nature a ‘literary’ one. There was even a formal, rhetorical term, one of Puttenham’s six ‘counterfeits’ in his list of poetic ornaments, for employing ‘time’ for the purposes of elevating description. Known as ‘c[h]ronographia’, it was in evidence

when we do plainly describe any time for delectations sake, as the Morning, the evening, midnight, the dawning of the day, the Sunne rising, the Sunne setting, the spring tyme, Sommer, Autumne, Wynter, tyme of warre, tyme of Peace.⁸⁰

Shakespeare is, then, employing chronographia when, in *Henry V*, he repeatedly harps on the changing time:

‘it now drawes toward night’ (TLN 1621) ‘’Tis Mid-night’ (TLN 1715), ‘It is now two a Clock’ (TLN 1786), ‘the Clocks’ name ‘the third howre of drowsie Morning’ (TLN 1805); ‘is not that the Morning which breakes yonder?’ (TLN 1936–7); ‘The Sunne doth gild our Armour’ (TLN 2167); ‘The Sunne is high, and we out-weare the day’ (TLN 2136).

This particular example of chronographia ensures, of course, that in a little over five hundred lines, a battle can be prepared for, then undertaken, then won: it compresses

⁷⁸ Kerrigan (1986), 34.

⁷⁹ William Empson’s theory, stated in Haffenden (1994), 2: 216, that Shakespeare knew scientists whose calculations had proved that a 40 minute orbit of the earth will counteract gravity and raise an object off the surface of the earth, relates to an understanding of physics most probably beyond the capabilities of the age—see Sokol (2003), 27.

⁸⁰ Peacham (1577), 142.

‘duration’, while also showing that Henry V, depicted as a man who ‘weighes Time | Even to the utmost Graine’ (TLN 1032–3), uses his time so well in battle that it seems to follow the speed of his command.

Seeing descriptions of time as serving a literary purpose will have enabled, and perhaps encouraged, Shakespeare’s use of ‘double time-schemes’. In *1* and *2 Henry IV*, the comic and historical plots are simultaneous, but the events concerning Falstaff, befitting his live-for-the-moment immediacy, take a number of days, while the events concerning the main plot, befitting its seriousness, take two to three months to unravel. In *Othello*, the couple’s relationship happens over a few days, perhaps even overnight—it has just been consummated when Desdemona is killed—but Iago has, simultaneously, poisoned Othello’s mind long enough for Desdemona conceivably to have slept with Cassio. Similarly, in *Romeo and Juliet*, Romeo has hardly gone when Juliet instigates plans for his return, but at the same time he travels to Mantua, acquires accommodation, waits for a messenger, and misses the messenger: ‘Romeo-and-Juliet’ and ‘Romeo’ occupy different realities.⁸¹ Exploiting chronographia lets two or more separate time-frames operate within one overarching narrative, so that time as personal experience and time as chronology need not tell the same story.

The use of chronographia extended beyond recounting simple ‘duration’, however. Chronographic description was sometimes employed as part of characterisation. So in *Richard III* the king is depicted as a man who sees ‘time’ exclusively from his own point of view—he starts the play with ‘now’, a word he repeats three times in his first ten lines—while repeatedly attempting to pervert the natural, temporal order. In the play’s final scenes, however, Richard loses control, seemingly over the instruments of measuring time, but actually over time itself. In the evening before the battle he demands ‘a watch’ in order to wake up at the correct time (suggestions that he is asking for a watchman misunderstand the importance of time-measurers to this play).⁸² After a night of bad dreams and ghosts, however, he oversleeps. The clock has failed him, and so too has ‘nature’: he has also slept through the cock’s crow.

Ratcliffe	My Lord.
Richard	Zoundes, who is there?
Ratcliffe	Ratcliffe, my Lord, tis I, the earlie village cocke, Hath twice done salutation to the morne, Your friendes are up, and buckle on their armor. ⁸³

⁸¹ Kinney (2004), 89. On double time-schemes more generally, see Driver (1964), 363–70; Driver (1960).

⁸² Shakespeare, *Richard III*, L3r. Were Richard to have had a watchman, he would not have woken late.

⁸³ *Ibid.*, M1r.

Time, from this point onward, slips away from Richard instrument by instrument. He demands to know the hour from a striking clock; from the sun—and, when the sun fails to shine, from an almanac:

Richard	Tell the clocke there. <i>The clocke striketh.</i> Give me a calender, who saw the Sunne to day?
Ratcliffe	Not I my Lord.
Richard	Then he disdaines to shine, for by the booke, He should have bravd the East an hower agoe. ⁸⁴

Richard's frantic, untimely morning is compared to that of the man who will triumph over him, Richmond. Richmond wakes up refreshed and in advance of his, apparently accurate, clock:

Richmond	How farre into the morning is it Lordes?
Lord	Upon the stroke of foure.
Richmond	Whie, then tis time to arme, and give direction. ⁸⁵

Shakespeare rotates through a series of literal measurers of time in order to illustrate that the temporal order, lost through Richard, will be re-established through Richmond. Chronographia shows how, at this point in the play, time, a major aspect of Richard's concept of himself, is no longer under the king's control.

A keenness to write chronographically, combined with the obvious untrustworthiness of timepieces, made Shakespeare very alert to the fact that time is experienced subjectively—that 'real' time is in this way more fictional than 'experienced' time. In *As You Like It* Rosalind describes the way that 'Time travels in divers paces, with divers persons'; with some 'Time ambles', with some, it 'trots', with some it 'gallops' and with some it 'stands stil' (TLN 1498–1501). But Shakespeare himself across his plays presented time as moving at a different 'pace' depending on story and speaker. Though in *As You Like It* he has Rosalind refer to the 'lazier foot of time' (TLN 1495), in *Midsummer Night's Dream* Helena sees time as 'hasty footed' (TLN 1227), while in *Twelfth Night* Orlando finds time 'giddy-paced' (TLN 889). Time for Shakespeare had descriptive properties that could be extended to characterise experience, character, event, and story.⁸⁶

Shakespeare's plays are all, then, chronographic rather than realistic in their use of time. History plays, being about sequential events in past time are bound to be chronographic, but all plays with a narrative structure explore 'the Hatch and Brood

⁸⁴ Ibid., M2r.

⁸⁵ Ibid., M1r.

⁸⁶ The only scholar to consider Shakespeare's chronographia in detail is Lewis (1968).

of Time' too (2 *Henry IV*, TLN 1504).⁸⁷ And, as chronographia is a descriptive art that depends on viewing time as a delightful illusion, it is bound to be at odds with 'real' time. As early modern theatre was in its nature chronographic—its plays describe their own fictional time, which speeds up or slows down depending on the action—it was, by extension, not concerned with simple chronology.

* * *

This article has argued that Shakespeare and his playhouse did not have much of an interest in 'real' play duration, and may have wished to suppress that information. But as has also been suggested, this was a period in which it was hard for anyone to have a great interest in actual time—which differed in nature, but also in quantity, device by device. Even time in its abstract has been shown to be shaped by the instruments through which it was imagined: they dictated whether it ran or crept, was loud or silent, was fast or slow, was eternal or endstopped, was visual or aural.

A look at the ways people used to tell the time in the early modern period has revealed how unlikely it was that the theatre had a public timepiece—whilst also showing that the idea of accurately measuring play duration arises from a misunderstanding of early modern attitudes to time. In a period when time was gleaned through falling sand or creeping shadows, heard through ringing bells, and hit by puppets, time's difficulty and its inaccuracy, its reliance on geography and sunshine, made it ripe for poetry and fiction, but poor for a public space not reliant on its production. The literal measures of time found in the playhouse were, as illustrated, not intended to time the length of performance, but its reverse: the fictional length of fictional moments, and hence the unfathomable and subjective nature of time itself. The 'two hours' of *Romeo and Juliet*, then, are as likely to be part of the play's fictional duration—the play is two *theatrical* hours long which might be any actual period of time—as part of its factual length. Here, then, is the final reason why the playhouse would not have had a public chronological instrument. Because the very act of measuring time would have given 'time' a reality and permanence and meaning that Shakespeare's plays sought to question, not confirm.

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⁸⁷ That Shakespeare explored different facets of time in each of the different genres history, tragedy and romance, is richly illustrated by Kastan (1982).

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